Amendments to the Claims

The following listing of claims will replace all prior versions and listings of claims in the application.

Listing of Claims

Claim 1 (currently amended) A method of modifying a virtual object stored within a computer, the method comprising the steps of:

representing a virtual object as a volumetric model;

converting a subset of the volumetric model into ~~an alternative~~a non-volumetric representation;

~~determining a response of~~modifying the ~~alternative~~non-volumetric representation according to a stimulus; and

modifying the volumetric ~~representation~~model so as to substantially represent ~~the response of~~the ~~alternative~~modified non-volumetric representation ~~to the stimulus~~.

Claim 2 (currently amended) The method of claim 1, wherein ~~determining a response of~~modifying the ~~alternative~~non-volumetric representation according to a stimulus comprises ~~determining a response of~~modifying the ~~alternative~~non-volumetric representation according to a first stimulus and further ~~determining a response of~~modifying the ~~alternative~~non-volumetric representation according to a second succeeding stimulus.

Claim 3 (currently amended) The method of claim 1, wherein modifying the volumetric ~~representation~~model comprises a change in shape of the volumetric ~~representation~~model.

Claim 4 (currently amended) The method of claim 1, wherein modifying the volumetric ~~representation~~model comprises converting ~~the~~a response of the ~~alternative~~non-volumetric representation to the stimulus into a response of the volumetric ~~representation~~model to the stimulus.

Claim 5 (original) The method of claim 1, wherein the subset of the volumetric model is the entire volumetric model.

Claim 6 (original) The method of claim 1, wherein the subset of the volumetric model is a portion of the volumetric model.

Claim 7 (original) The method of claim 1, wherein the volumetric model comprises voxels.

Claim 8 (original) The method of claim 1, wherein the volumetric model comprises values spaced in a three-dimensional grid.

Claim 9 (currently amended) The method of claim 1, wherein the ~~alternative~~non-volumetric representation comprises a surface representation.

Claim 10 (currently amended) The method of claim 1, wherein the ~~alternative~~ non-volumetric representation comprises a set-of-triangles representation.

Claim 11 (original) The method of claim 10, wherein the stimulus comprises a weighted displacement function defined on vertices of the set-of-triangles representation.

Claim 12 (currently amended) The method of claim 1, wherein the ~~alternative~~ non-volumetric representation comprises a selected one of a polygon set, a bezier surface, a b-spline surface, a procedural surface, and a NURBS representation.

Claim 13 (cancelled)

Claim 14 (original) The method of claim 1, wherein the stimulus is a stimulus from a user using a haptic interface.

Claim 15 (original) The method of claim 14, wherein the haptic interface is a force feedback interface.

Claim 16 (original) The method of claim 14, wherein the haptic interface has at least three degrees of force feedback.

Claim 17 (original) The method of claim 1, further comprising the step of displaying the virtual object on a computer display.

Claim 18 (currently amended) The method of claim 1, wherein the volumetric ~~representation~~ model and the ~~alternative~~ non-volumetric representation comprise representations having different numbers of dimensions.

Claim 19 (currently amended) The method of claim 1, wherein the ~~applied~~ stimulus comprises at least one of a displacement function, a smoothing function, a warping function, a volumetric interference, an areal interference, a result of a simulation, a control point modification, a data re-fitting, and a force.

Claim 20 (currently amended) The method of claim 1, wherein the ~~applied~~ stimulus is applied to the object in real time.

Claim 21 (currently amended) The method of claim 1, further comprising the steps of:

transforming the ~~alternative~~ non-volumetric representation into a third representation;

modifying the third representation in response to an applied stimulus; and

transforming the modified third representation to a modified volumetric representation.

Claim 22 (original) The method of claim 21, wherein transforming the modified third representation to the modified volumetric representation comprises generating an intermediate modified representation.

Claim 23 (currently amended) The method of claim 1, wherein the stimulus comprises a user

motion in ~~the~~ at least three-dimensional space.

Claim 24 (original) The method of claim 1, further comprising applying a feedback force to a

user, the feedback force being generally consistent with a geometric shape of a modified virtual

object.

Claim 25 (original) A method of modifying a volumetric representation of an object, the method

comprising the steps of:

       transforming at least a portion of the volumetric representation into a polygonal set

          representation;

       modifying the polygonal set representation; and

       modifying the volumetric representation to substantially represent the modification made

          to the polygonal set representation.

Claim 26 (original) The method of claim 25, wherein the modification comprises a selected one

of a displacement function, a smoothing function, a warping function, a volumetric interference,

an areal interference, a result of a simulation, a control point modification, a data re-fitting, and a

force.

Claim 27 (original) A method of modifying a volumetric representation of an object, the method

comprising the steps of:

       transforming at least a portion of the volumetric representation into a surface-based

          representation;

       modifying the surface-based representation; and

       modifying the volumetric representation to substantially represent the modification made

          to the surface based representation.

Claim 28 (currently amended) A system for modifying a virtual object stored within a computer, the system comprising:

a representation module that represents a virtual object as a volumetric model;

a conversion module that converts a subset of the volumetric model into ~~an alternative~~a non-volumetric representation;

an analytic module that ~~determines a response of~~modifies the ~~alternative~~non-volumetric representation according to a stimulus; and

a modification module that modifies the volumetric ~~representation~~model so as to substantially represent the modified ~~response of the alternative~~non-volumetric representation ~~to the stimulus~~.

Claim 29 (currently amended) The system of claim 28, wherein the analytic module that ~~determines a response of~~modifies the ~~alternative~~non-volumetric representation according to a stimulus comprises an analytic module that ~~determines a response of~~modifies the ~~alternative~~non-volumetric representation according to a first stimulus and further ~~determines a response of~~modifies the ~~alternative~~non-volumetric representation according to a second succeeding stimulus.

Claim 30 (currently amended) The system of claim 28, wherein the modification module that modifies the volumetric ~~representation~~model comprises a modification module that changes a shape of the volumetric ~~representation~~model.

Claim 31 (currently amended) The system of claim 28, wherein the modification module that modifies the volumetric ~~representation~~model comprises a modification module that converts ~~the~~ a response of the ~~alternative~~non-volumetric representation to the stimulus into a response of the volumetric ~~representation~~model to the stimulus.

Claim 32 (original) The system of claim 28, wherein the subset of the volumetric model is the entire volumetric model.

Claim 33 (original) The system of claim 28, wherein the subset of the volumetric model is a portion of the volumetric model.

Claim 34 (original) The system of claim 28, wherein the volumetric model comprises voxels.

Claim 35 (original) The system of claim 28, wherein the volumetric model comprises values spaced in a three-dimensional grid.

Claim 36 (currently amended) The system of claim 28, wherein the ~~alternative~~ non-volumetric representation comprises a surface representation.

Claim 37 (currently amended) The system of claim 28, wherein the ~~alternative~~ non-volumetric representation comprises a set-of-triangles representation.

Claim 38 (original) The system of claim 37, wherein the stimulus comprises a weighted displacement function defined on vertices of the set-of-triangles representation.

Claim 39 (currently amended) The system of claim 28, wherein the ~~alternative~~ non-volumetric representation comprises a selected one of a polygon set, a bezier surface, a b-spline surface, a procedural surface, and a NURBS representation.

Claim 40 (cancelled)

Claim 41 (original) The system of claim 28, wherein the stimulus is a stimulus from a user using a haptic interface.

Claim 42 (original) The system of claim 41, wherein the haptic interface is a force feedback interface.

Claim 43 (original) The system of claim 41, wherein the haptic interface has at least three degrees of force feedback.

Claim 44 (original) The system of claim 28, further comprising a display module that displays the virtual object on a computer display.

Claim 45 (currently amended) The system of claim 28, wherein the volumetric ~~representation~~ model and the ~~alternative~~ non-volumetric representation comprise representations having different numbers of dimensions.

Claim 46 (currently amended) The system of claim 28, wherein the ~~applied~~ stimulus comprises at least one of a displacement function, a smoothing function, a warping function, a volumetric interference, an areal interference, a result of a simulation, a control point modification, a data re-fitting, and a force.

Claim 47 (currently amended) The system of claim 28, wherein the ~~applied~~ stimulus is applied to the object in real time.

Claim 48 (currently amended) The system of claim 28, further comprising:

 a second transformation module that transforms the ~~alternative~~ non-volumetric representation into a third representation;

 a third modification module that modifies the third representation in response to an applied stimulus; and

 a third transformation module that transforms the modified third representation to a modified volumetric representation.

Claim 49 (original) The system of claim 48, wherein the third transformation module that transforms the modified third representation to the modified volumetric representation comprises a transformation module that generates an intermediate modified representation.

Claim 50 (original) The system of claim 48, wherein at least two of the first, second and third modification modules are the same module.

Claim 51 (original) The system of claim 48, wherein at least two of the first, second and third transformation modules are the same module.

Claim 52 (currently amended) The system of claim 28, wherein the stimulus comprises a user motion in ~~the~~ at least three-dimensional space.

Claim 53 (original) The system of claim 28, further comprising a force feedback module that applies a feedback force to a user, the feedback force being generally consistent with a geometric shape of a modified virtual object.

Claim 54 (original) A system of modifying a volumetric representation of an object, the system comprising:

  a transformation module that transforms at least a portion of the volumetric representation into a polygonal set representation;

  a first modification module that modifies the polygonal set representation; and

  a second modification module that modifies the volumetric representation to substantially represent the modification made to the polygonal set representation.

Claim 55 (original) The system of claim 54, wherein a selected one of the modification of the polygonal set representation and the modification of the volumetric representation comprises a selected one of a displacement function, a smoothing function, a warping function, a volumetric

interference, an areal interference, a result of a simulation, a control point modification, a data re-fitting, and a force.

Claim 56 (original) A system of modifying a volumetric representation of an object, the system comprising:

a transformation module that transforms at least a portion of the volumetric representation into a surface-based representation;

a first modification module that modifies the surface-based representation; and

a second modification module that modifies the volumetric representation to substantially represent the modification made to the surface based representation.

Claim 57 (new) The method of claim 1, wherein the non-volumetric representation comprises a selected one of a point cloud, a particle system, and a collection of curves.

Claim 58 (new) The method of claim 28, wherein the non-volumetric representation comprises a selected one of a point cloud, a particle system, and a collection of curves.